The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. L
No. 1292

SATURDAY, APRIL 1, 1944
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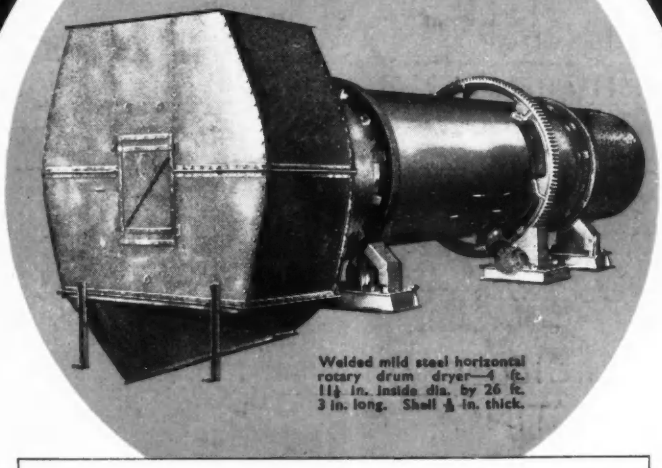

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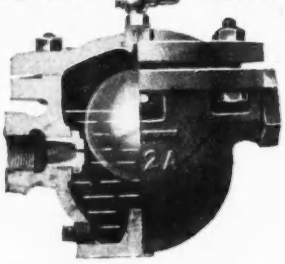

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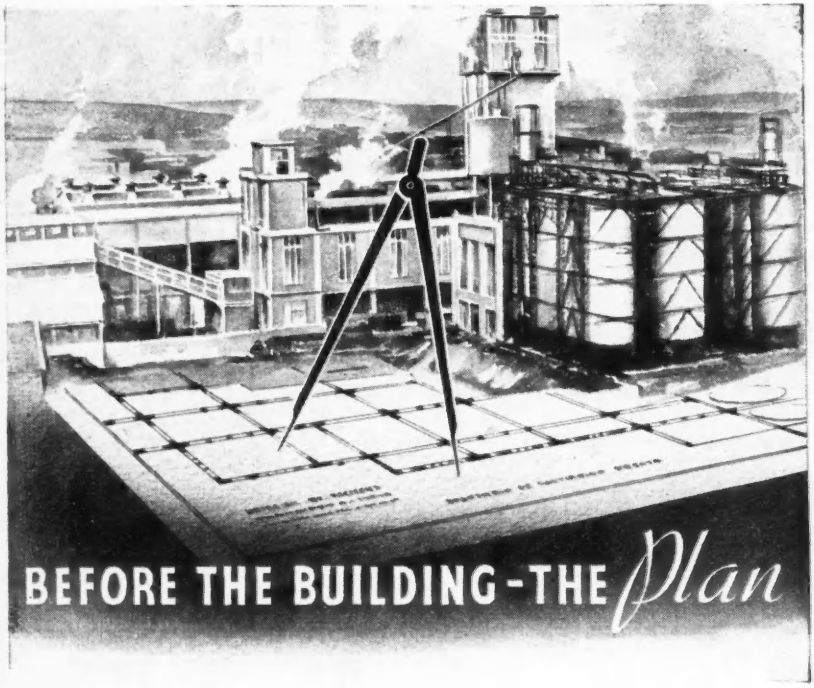

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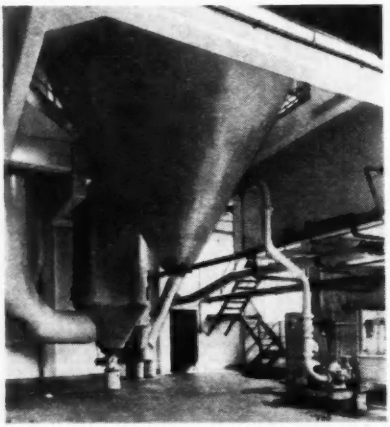

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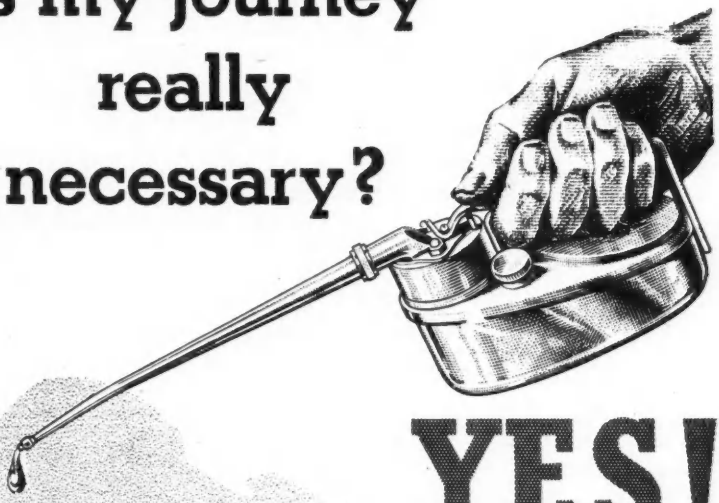

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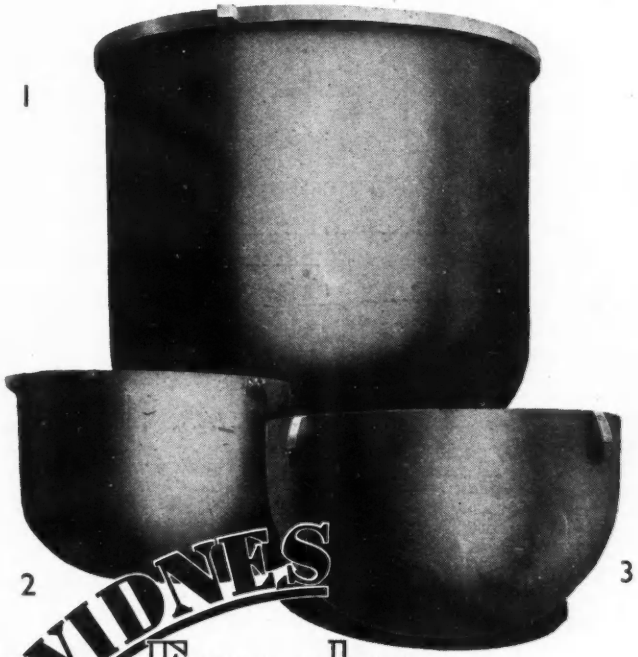

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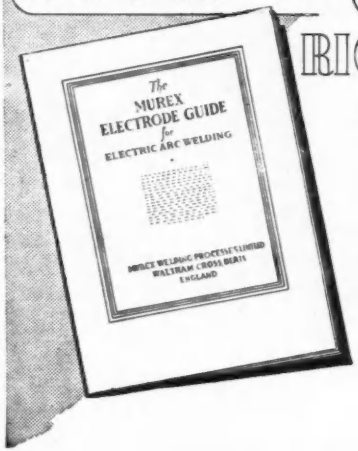

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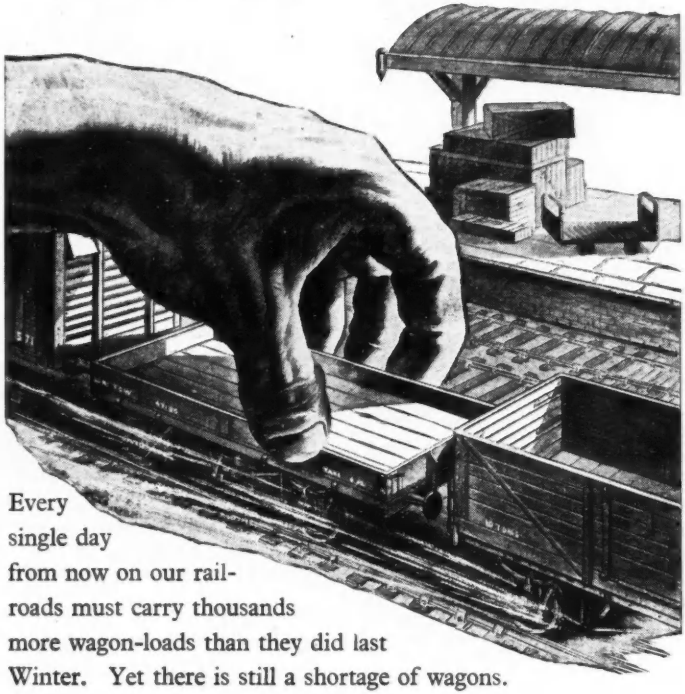

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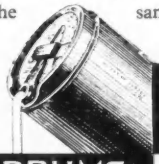

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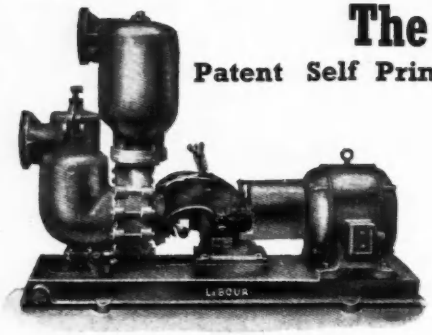

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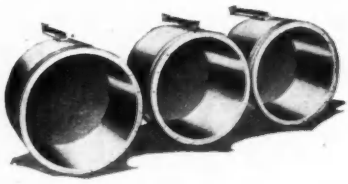

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VOL. L
No. 1292

April 1, 1944

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Private Enterprise or State Control?

THE questions raised by the title of this article are the subject of intense discussion at the present time. A contribution to the discussion has lately been made by Mr. Oliver Lyttelton, Minister of Production, which is worth careful consideration. It is obvious that politicians are trying to cross a rather dangerous stream by stepping gingerly on ill-balanced stones. Many of the speeches made on this subject by Ministers and others are designed rather to provoke discussion than to expose the mind of the Government. In the course of this particular journey across the symbolic stepping stones, Mr. Lyttelton has endeavoured to lay down the borderline between private enterprise and State enterprise, and it is of some interest to examine his views.

Mr. Lyttelton summarised the arguments against State trading as follows: first, the State must aim at a certain uniformity in salaries; secondly, the Minister in charge of State trading would be under great pressure to conceal inefficiency, and there would be a tendency to underpin uneconomic industries by tariffs, import quotas, subsidies, or the like; thirdly, without the profit motive and without the interplay of prices, it was almost impossible to get the flexibility into the business system which modern commerce demanded; fourthly, the State must play safe, and could not afford to risk the taxpayers' money as a private individual risked his own; lastly, the Government, charged with all matters of the highest political importance, should not be diverted from their study by direct negotiations on matters like wages and profits with those upon whose votes it depended to decide the graver issues.

On the other hand, Mr. Lyttelton believes that the State should exercise control over some industries and should in fact engage in State trading under particular conditions. He maintained, for example, that where profits are to be made as a result of statutory right to do so the State should have "some right of control" over the enterprise. We shall have cause to examine this case rather more closely. Mr. Lyttelton also believes that public services which may depend on the same right and from which most of the risks had been eliminated should be handled directly by the State, and his reasons for this appear to lie in the "organising power of

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the State to provide common services at cheap prices to all and sundry." In short, the balance between State and private enterprise is to be obtained by allowing the State to undertake all services which do not depend on any risk whatever and to allow private enterprise to operate where there is any risk. This seems very much of a heads-I-win, tails-you-lose sort of arrangement, but Mr. Lyttelton was wise enough to say that private enterprise, having run the risk, should reap a profit.

How far private enterprise will be allowed to reap such a profit is one of the points that must be cleared up. If there were to be any general Government control over industry, we should quickly find ourselves in a position in which manufacturers now are in respect of war contracts. Losses on such contracts have to be borne by the manufacturers, and the occasional very profitable contracts which can offset these losses, and which would normally do so, are cut down after costing to a bare profit on capital, leaving nothing for research and development work and nothing for rehabilitation or for change-over. If industry is to be prosperous its control by the State will have to be very slender indeed. So far as we know, the Post Office is the only example of a whole Government department which is run on efficient lines; yet even here the increase in postage costs from 1d. to 2½d. within comparatively few years has cast some doubt on its efficiency, since in private enterprise costs to the public decrease with increasing output.

We must not forget that any Government department which now tries to take over an industry will have to do so at short notice and without experience of that industry. The mess that Government control made of the coal industry is a terrible warning. Whether the State should take over those businesses which are empowered to make profits by statutory right must depend on what is to be our attitude towards them. It could be argued, for example, that railway transport services could be reduced to a uniform level of efficiency, to standard charges and so forth, and could therefore be taken over by the Government. Yet even in such an industry there is still room for a lot of improvement in technique, in costs, and in services rendered. Moreover, the railway industry is far from reaching uniform technical practice; it is in competition with road transport; it is constantly improving its rolling stock; it will have to consider the important problem of electrification. In short, taking the railways as an example, there would seem to be few large businesses in this country which have reached such a level of perfection that they could be safely turned over to the Civil Service to operate.

Although we have suggested before now that technical men are always anxious to make advances and do not of themselves need the spur of competition, it is quite obvious that since businesses are controlled primarily by those who are not technical there must be some spur, other than interest in the subject, to lead to improvements. Government departments are not subject to competition and that is the essential weakness of practically every form of State enterprise. State control is one thing; State enterprise is another. But even State control must be exercised with a light rein and with the most careful attention to its effect upon industry.

Mr. Lyttelton really answered himself towards the end of his address. He confessed himself an optimist in regard to our powers of recovery and our powers to recreate our wealth. He maintained that "anyone who believes that the world cannot recover for a long time from the effects of the war is living in another century and we must not elect him either to our legislature or to the boards of any of our companies." Mr. Lyttelton then declared that in endeavouring to regain our great trading position after the war, to improve the standards of life and to make our contribution towards balanced international trade, we should require first to promote research and development. We are required to supply a new world with new goods, to fill a new demand with a new product. If our scientists and research workers will apply to our post-war problems the ingenuity they have shown in the war, we may well regain the same position that we occupied when we were the first country to apply coal to the generation of power and when we led the world in railway development. In the long run it depends entirely on whether we use our brains or not.

NOTES AND COMMENTS

Technical Education

AS might have been expected, the parliamentary discussion on the Education Bill in its committee stage produced some comments on the state of technical education in this country. The President of the Board of Education averred that we should be obliged, if we were to put up any sort of show beside our industrial competitors—friends and enemies alike—to concentrate after the war on producing the most highly-skilled technologists. It was his intention, he said, to subject the relation of the universities with the technical colleges to closer examination, and to appoint a Departmental Committee to that end. He admitted that he had been impressed by the attitude of students towards their technical colleges, which differed very little from that of university students to their *almo mater*.

"Half-Baked" Students

SOME liveliness was introduced into the debate by a remark of Mr. Colegate's, to the effect that technical college students whom he had examined as candidates for technical employment of the highest type, especially in chemistry, were in scores of cases "half-baked" and unfit to be anything more than "lab.-boys." Mr. Linstead took exception to the epithet and said that it was a miracle that they were "baked" at all, considering the circumstances in which many of them had to do their studying at the technical colleges after a heavy day's work. Also, the research facilities at our technical schools were poor. The need was not merely to bring the standard of the technical colleges nearer to that of the universities, but to co-ordinate the work between the two types of institution, and save overlapping. A good word was put in by Mr. Muff for certain industrial concerns he had visited—he quoted Newton, Chambers & Co.—which encouraged their young employees to do something to develop their personalities and to understand what the firm was doing. On the whole, the subject of technical education was reasonably well ventilated, and Clause 40 was passed without more ado.

University Development

PARSIMONY is the essential characteristic of our expenditure on universities, in comparison with that of the United States, according to the view of Sir Ernest Simon, chairman of the council of Manchester University. To support this opinion he produces some significant facts, and he has published these in a valuable 20-page booklet, *The Development of British Universities* (Longmans, Green; 1s.), which, he suggests, may help to form a basis for the discussion of the whole university position both now and during the next few years. The facts are, indeed, most revealing, and will bear pondering over. For instance, the total university income in the U.S.A. (in millions of pounds) in 1937/38 was 97, in Great Britain it was 6.5; allowing for the respective populations, the ratio of expenditure per 1000 people was five to one; in 1938 Britain had 50,000 students, whereas in the U.S. there were over 1,000,000 students and 100,000 whole-time staff. Admittedly some of the American work is of lower standard, yet much of their post-graduate work is of the highest class; and there is no doubt whatever of the benefits accruing from the devotion to higher education of so many young people of the 18/22 age-group. The majority of leading industrialists in America have had a university education and understand the value of its results. In many of our great industries (Sir Ernest cites the Lancashire cotton industry) few of the men in important positions are capable of making use of the results of the work of our research associations. We are already falling behind the U.S.A. and other countries in some of the most important of the more scientific industries.

A National Organisation

WHAT remedies, it will be asked, does the author suggest in order to alleviate this unhappy situation? First, he suggests, should come the setting up of some form of national machinery to study the subject generally, and, more particularly, the wise distribution of any further increases in the university grant. The existing University Grants Com-

mittee has done its distributive work with scrupulous fairness, but it cannot cope with the detailed investigation of university problems. Its hand should be strengthened by the appointment of departmental or professional advisory committees to deal with these problems as they arise. For instance, Manchester University is studying the best method of developing its Schools of Engineering. How should they be distributed? Should there, for example, be a strong School of Chemical Engineering? Such questions might well be efficiently answered by an Engineering Advisory Committee.

Redundant Schools

OTHER vexed questions that a really strong national Universities Committee could study include: staff salaries; conditions at civic, as distinct from residential, universities; careers; and redundancy, with its converse problem of gaps. How many people realise that we have eight schools of mining, turning out between them 20 graduates annually, or that there were recently six university Forestry Departments, with a total annual output of 25 graduates? At the same time aeronautical engineering has been almost totally neglected by our universities. Such questions as these, and many others of equal urgency, seem to justify the establishment of a national organisation to cope with them. We like Sir Ernest Simon's suggestion that any such organisation should be independent of the Treasury, and answerable to the Lord President of the Council.

Total Gasification of Coal

IN his recent address to the Southern Association of Gas Engineers, Dr. E. V. Evans, chairman of the Gas Research Board, referred to investigations carried out in the Board's laboratories with a view to perfecting a process for the total gasification of coal. Several processes have been studied and from these the Board has selected two lines of development for further examination on a larger scale. The first is the carbonisation of coal in hydrogen under pressure, whereby much of the coal carbon is converted to methane; the heat liberated in this reaction is sufficient to complete the carbonisation. This process, said Dr. Evans, would have to be stopped after about half the charge of coal had disappeared, as the reactive residue has to be gasified in steam and oxygen to provide the hydrogen required in the first stage. The second stage may not present great difficulties, but in carrying out the first stage problems arise from the increased caking of coal which occurs in the presence of compressed hydrogen. Dr. Evans expects difficulties in dealing with the coal as it passes through the plastic phase. He suggests, however, that the coal constituents which give rise to this plastic phase provide a valuable primary tar that is capable of conversion—by hydrogenation—into motor spirit and other liquid fuels.

A Second Process

THE second group of processes the Board is considering involves the gasification of coal in steam and oxygen, and the subsequent enrichment of the gas with methane produced catalytically. The caking properties of coal should be less troublesome in this system, which could be operated to gasify coke resulting from present methods of carbonisation. The catalytic synthesis of methane from hydrogen/carbon-monoxide mixtures has hitherto presented many practical difficulties (owing to the deterioration of the catalyst), but recent studies of this reaction have given reasonable expectation that the practical difficulties can be overcome. Laboratory work has shown that the theoretical principles of the processes are sound, and Dr. Evans believes they will prove to be sound economically.

URSOLIC ACID

Ursolic acid is being produced on a pilot-plant scale by the American firm, Cranberry Canners, of Massachusetts. Cranberry waste material contains the highest percentage of ursolic acid known to be present in any material. This white, flaky resinous acid can be used as an emulsifying agent, is soluble in alcohol and benzene, and has therapeutic qualities. It has a high melting-point and raises the melting-point of other waxes when combined with them. It has been used in the manufacture of cosmetics, as an emulsifier in mayonnaise, and its use in carbon paper is now being investigated. The crude ursolic acid and a brown wax are taken from the skins and refined to give the resin acid and a thermoplastic substance.—*Chem. and Met. Eng.*

Chemicals in South Africa

More Local Manufactures : New Use for Vermiculite

A NEW South African firm is planning to manufacture fine and heavy chemicals, including sulphated fish and vegetable oils for tanning, sulphated fatty alcohols for use as wetting agents and detergents, and also pharmaceutical preparations. A special department will manufacture axle grease and farm greases. Adhesives for machine labelling, bottling, and the printing and paper trades will also be made, with casein and dextrine glue. The entire plant was designed and made in South Africa.

Litharge and Chromates

A Johannesburg company has begun the manufacture of litharge for assay service on the gold mines and for making motor car batteries. This litharge is of high purity and compares favourably with the qualities previously imported. Neatsfoot oil, of both the ordinary commercial type and of special clarified grade, is being made in Johannesburg by a firm that is also producing peach kernel oil. Other Johannesburg firms are developing the manufacture of essential industrial chemicals, among which the newest products are potassium bichromate for the match industry, sodium nitrate for fertilisers, white lead in powder form for the paint industry, and chromic acid for the electro-plating industry. Yet others are producing heat-reactive glues, specially made for plywood bonding, carboard spiral winding, laminated wood products, and other uses where a strong bond is needed and heat can be applied. Turkey red oil and water-soluble oils, all previously imported, are also being manufactured.

Production of paints includes oil liquid paints, industrial finishes, enamels, lacquers, primers and driers, and varnishes, including spirit and insulating varnishes. This is helping to compensate for the serious lack in South Africa of many types of paint. Such firms often have a dry-pigment department in which is made a large selection of colours, including chrome-red and emerald-green. Another Johannesburg concern reports that after two-and-a-half years of extensive research they are able to produce sulphated oils with a 6.6 per cent. degree of sulphation of a quality which compares favourably with the world's best. These oils are made entirely from South African materials. Among recent uses in South Africa for sulphated oil is as a neutraliser for acid water in the mining industry, in certain ore crushers, and in the cosmetic industry.

Several factories producing cooking oils, etc., have been opened. They also express linseed and castor oil, and make hydrogenated fats. In spite of increased demand, the raw material question has caused anxiety. Large consignments of nuts have been lately landed, but there is always uncertainty about when the next lot may be expected. Greater use is being made of local products, such as wheat, maize, groundnuts, and olives, but it is essential to import large quantities of ground nuts, soya beans, and sesame seed to keep the factories going. The main sources of such supplies are East Africa and South America, although in normal times much was derived from the East.

Russia has been supplied with several tons of pyrethrum seed by the Kenya settlers to restart the Caucasian pyrethrum industry. Kenya growers have been asked to increase their output of this valuable insecticide and are now the biggest producers in the Empire, as some 41,000 acres in the Kenya highlands being under the crop. The British Government has agreed to buy all the pyrethrum from a maximum acreage of 50,000 for the next four years at the satisfactory price of 13s. 3d. per lb. of dried flowers. The seed has also been supplied to other parts of the British Empire and to several of the United Nations.

Naphthalene Exports

South African exports of naphthalene are still increasing, as considerable quantities have been sent to the United States for the production of artificial resins. It is anticipated that this by-product of the Iron and Steel Corporation in Pretoria will be exported in larger quantities in the future. The compressed naphthalene has been used to protect South African wool, hides and skins. The steel works are also selling quantities of tar for road making, and it is anticipated that after the war large quantities of it will be used on national roads in the Union.

The Cape herb, buchu, an old-established remedy for indigestion, colds and stomach troubles, has seen a revival in demand since the war. In the past season no less than 90 tons of the herb were exported to Great Britain and the United States, largely to the latter country; small consignments have also been sold to Australia and New Zealand. The pre-war price per lb. has soared to 3s., three times the pre-war charge. American prices are generally lower than those paid in London, but British imports of the herb have been restricted severely. The local market for the herb is small, supplies being sold to pharmacists and to certain distilleries that use it to produce a medicinal buchu brandy.

Large quantities of South African explo-

sives have been used in the North African and Mediterranean war zones, and the South African Air Force is still dropping bombs filled with explosives from the Union. It is expected that in the future large quantities of such explosives will be used against Japan. In addition to this the usual output of explosives is necessary to keep the coal, gold and other mines working. The Director-General of Supplies has stated that the South African explosives factories have been enlarged and the increased quantities produced have been used not only in local filling factories, but have also been exported to other countries with no explosives industry of their own. This activity is believed to have resulted in a steady improvement in quality. For some time now the mines have been using gelignite in place of nitroglycerine. Before the war a large quantity of this gelignite was imported, but it is now made locally. Large quantities of nitrocotton are being made for munitions and mining use, pure cellulose from waste wattle bark and banana stems being experimented with. This may yet prove to be an excellent raw material.

The Salt Industry

South Africa has been suffering a temporary but serious shortage of salt, due in large part to the unseasonable rains, but the position is expected to improve. As no artificial evaporation processes are employed, the South African salt industry is solely dependent upon sunshine for maintaining its supplies. The Government is giving every possible aid to the industry. Large quantities of salt have been commandeered, and certain manufacturers have priority in obtaining supplies. The result has been that less salt than ever before has been available to the public. Some wholesale merchants would not handle salt because the Government-controlled price did not allow a large enough profit. Formerly, they could make 1s. 6d. retail on 100 lb. of salt, but now poor quality salt was bought for 8s. 3d. per 100 lb., and had to be sold for 8s. 4d. In addition, the merchants have to provide paper bags, which cost five times as much as previously, with the result that the sale of salt shows a loss.

For over ten years now tinning and soldering fluxes and other such engineering requirements have been made in Natal, and since the war this industry has been able to maintain a regular and constant supply of the important fluxes needed for essential war services. Foremost among the fluxes supplied so largely since the war is a tinning compound, for preparing the face of bearing casings with a surface of pure tin prior to pouring in white metal. This is stated to be of satisfactory quality.

The war has deprived the South African wattle growers of some of their best overseas markets, for at one time large quantities of such South African products were sold to Japan, and in the first year of this war exports from the Union reached the record figure of £1,307,000. Since then there has been a steep decline, since although there has been some research into the question of increased absorption of wattle products in the Union, so far no solution appears imminent. It is still hoped that more wattle bark will be used in the tanning industry and the prospect of using a considerable quantity of wattle wood in South Africa's growing paper industry is being explored.

Perfumes have been made in South Africa for many years now, but since the war local manufacturers have been making keener attempts to establish themselves, feeling they will never again have so good an opportunity. The leading manufacturers, in order to maintain a high standard of quality, have only marketed perfumes that have been maturing for about three years. The manufacturers in such cases warrant the bouquet to be equal to any imported perfume. At the same time they have only been able to offer limited supplies, and the prices for these have been rather higher than the local product should be. It is not yet certain that the South African manufacturer can hold this market when peace allows free importation.

There has been an important development in experiments with the blowfly "repellent" evolved by Mr. Struwig, a Hanover farmer. These experiments, it is stated, have shown that the "repellent" also prevents maggot infestation and kills locusts.

Vermiculite in Enamelling

Details of the method of using vermiculite in a new enamelling process are given in *S. Afr. Min. and Eng. J.* (1943, 54, Pt. II, 2650, p. 231). The process is employed by the Union Enamel Co., Ltd., Durban, under S.A. Pat. No. 928 (March 27, 1943). The invention relates to improvements in enamelled metal articles, name-plates, signs, and similar ware. Previously, the commercial production of such articles has been limited to the colour range of various metallic oxides. A purpose of the present invention is to give to vitreous or porcelain enamelled articles a finish similar in appearance to metal, such as gold, brass, copper, or bronze.

Steps in the method of producing this metallic appearance include introducing crude vermiculite into a furnace at a temperature of between 1650° F. and 2000° F., and not exceeding 2300° F.; cooling the heated vermiculite, crushing and passing the cooled material through a sieve or sieves and removing the dust; and applying the crushed and sieved vermiculite to the surface of the article during the manufacture

and before the last firing operation. The vermiculite may be mixed with enamel and the mixture applied to the article, or the vermiculite may be dusted or sprayed over enamel which has been applied to the article while the enamel is wet.

Crushing and Sieving

The heat treatment transforms the combined moisture into steam which, in an effort to liberate itself, causes an explosive expansion of the plate-like crude material into a honeycombed granule, not unlike an accordion and extremely brittle or friable. Immediate cooling of the expanded material toughens the granules into a durable, rubbery aggregate. The material is then crushed and passed through sieves; for example, the crushed material may be passed through two sieves, the first of which may be of about 25-mesh gauze and the second 40-mesh. The product is then put into a receptacle with an outer mesh of finer gauze, 60-mesh being suitable. This is connected to a compressed-air pipe-line, and the material in it is subjected to compressed air treatment to eliminate the unrequired powdered material or dust, an air pressure of about 60 lb./sq. in. being suitable. The resultant product left in the container is, in appearance, very much like gold dust. A similar but less satisfactory and slower result may be obtained by subjecting the sieves, as before indicated, to agitation or vibration.

The enamelled articles are prepared in the usual commercial manner, that is, by the application and firing on of the primary coat, followed by the application and firing on of the required base colour. To obtain the metallic appearance, the powdered vermiculite is mixed with enamel according to the colour desired: *e.g.*, for brass, yellow enamel; and for bronze, bronze-brown. Water is then added until the density of the mixture is about the same as ordinary commercial porcelain.

The article having been sprayed with vitreous or porcelain enamel, while still wet, is resprayed with the vermiculite enamel, and is then dried in the usual way. The surface of the dried enamel is then lightly rubbed with the fingers, or a soft pad, just enough to expose the granulated vermiculite, and is finely fired, like any other vitreous enamel product. After firing, the surface is lightly rubbed over with fine emery paper or other abrasive material to remove any loose particles of vermiculite.

An alternative method is to dust the dry powdered vermiculite on to the last application of porcelain enamel while still wet, and when dry proceed in the manner indicated.

American Sugar Research

Co-operative Programme Announced

A LONG-RANGE programme of research on sugar, the most familiar and yet one of the least understood scientifically of all the products of nature, is to be undertaken at the Massachusetts Institute of Technology in co-operation with the newly-established Sugar Research Foundation of New York. Plans for the project were made public in a joint announcement by Dr. Karl T. Compton, president of the Institute, and Mr. Joseph F. Abbott, president of the Sugar Research Foundation, which has made a grant of $125,000 for a five-year programme. Dr. Robert C. Hockett, who has been given leave of absence from the Institute's faculty to become scientific director of the Sugar Research Foundation, will be in charge of the scheme.

Dr. Compton described the scheme as another step in the Institute's policy of co-operation with industry in fundamental research to improve industrial processes and develop new products. This sponsored research on sugar made it possible to continue and expand the Institute's fundamental investigations in the field of carbohydrate chemistry.

Provision for Fellowships

Mr. Abbott announced his belief that the chemical studies conducted under the arrangement described would not only extend knowledge of the rôle of sugar and other carbohydrates in the human body but would also unfold wholly new industrial uses for sugar and its derivatives. An important objective would be the training of scientists in the field of carbohydrate chemistry to prepare them for service in the industry for further technical studies. Provision was also made for fellowships for young graduates, who were candidates for advanced degrees, to permit them to continue their work in this promising field. The number of carbohydrate chemists in the U.S.A., he pointed out, was extremely limited.

The operation of the laboratory is the first project in the programme of the Sugar Research Foundation, which embraces comprehensive research and public educational projects to demonstrate the value of sugar products in the diet; the development of new uses for sugar and its by-products; and the transmission of pertinent and accurate information about sugar as a food. Sugar, Mr. Abbott, commented, whether from cane or beet, is, incidentally, one of the purest chemical substances known to man and is produced in enormous quantities at relatively low cost. As an inexpensive source material, its chemical conversion to substances which can be utilised for other purposes than as a food demands the most advanced investigation.

Parliamentary Topics

Hungary's Oil Production

IN the House of Commons last week, Mr. Dingle Foot, Parliamentary Secretary to the Ministry of Economic Warfare, told Mr. A. Edwards that oil production in Hungary had increased very substantially during the war, and almost certainly the greater part of such production was exported to Germany either as crude oil or as refined products. His department was in possession of statistics on this subject, but he did not propose to publish them.

Royalties on Enemy Patents

In reply to Mr. Ellis Smith, the President of the Board of Trade (Mr. Dalton) stated that, in addition to enemy-owned patents now being used by Government departments, licences had been granted during the war in respect of more than 1000 German-owned patents for commercial purposes, and more than 1000 others were probably being worked here under pre-war licences.

Mr. E. Smith: In regard to German patents, is the Government's policy to see that not a penny should be allowed to go to German interests after this war?—Mr. Dalton: The payment of royalties is very simple. No royalties are being paid in respect of any enemy-owned patent being operated by the Government. With regard to private interests payments are made to the Custodian of Enemy Property, and the disposition of these moneys will be determined in the peace treaties.

Mr. E. Smith then asked for an unequivocal answer as to whether it was the Government's intention to allow one penny piece to be paid to any German or subsidiary interests after this war.

Mr. Dalton: The Government has taken no decision which would lead to any such payments being made.

Magnesium Plant Costs

Sir Waldron Smithers asked the Minister of Aircraft Production what action had been contemplated on the Report of the Select Committee on the £850,000 spent on a magnesium plant and on the discrepancy between the estimated cost of £300,000 and the actual cost £1,600,000; and what disciplinary action was contemplated. Sir Stafford Cripps replied that there was in 1940 an urgent need for additional magnesium producing capacity and the decision to build the magnesium plant was taken in the light of all other possible alternatives then open to the Department. It was considered by those then responsible as the most effective way of meeting the urgent need, and he saw no reason to think that the decision taken was not justified. Accordingly, the last part of the question did not arise. The other part of the question, dealing with the discrepancy between actual and estimated cost of a magnesium factory was a matter for the Minister of Supply.

New Control Orders

Export of Chemicals

THE principal changes effected by the Export of Goods (Control) (No. 1) Order, 1944 (S. R. & O. 1944, No. 320), are as follows:

1. The item relating to gums, etc. (*see* THE CHEMICAL AGE, October 3, 1942, p. 298); has been replaced by the item "gums, resins (including oleoresins) and lacs, natural, not specified elsewhere in this schedule, and mixtures (other than medicinal preparations) containing such gums, etc."

2. (a) The following items have been deleted from the Export of Goods (Control) (No. 10) Order, 1943 (*see* THE CHEMICAL AGE, January 1, 1944, p. 17): aloxite, alundum and carborundum (under the heading "Abrasives"). The export of the first two items continues to be controlled as aluminium oxide, fused, and of the last item as silicon carbide. The above are operative from April 17.

3. The existing control in respect of carbon electrodes has been modified and the item relating thereto has been replaced by the item "carbon electrodes other than electric lighting carbons."

4. Licences will not be required, in future, in respect of the following goods, unless exported to those destinations to which the export of all goods is controlled: Camphor monobromide; iodides; inorganic; iodine; iodoform; iodoxyl; and sodium campho-sulphonate. It should be noted, however, that the export of certain inorganic iodides continues to be controlled under other specific headings in the list, *e.g.*, lead and zinc iodides.

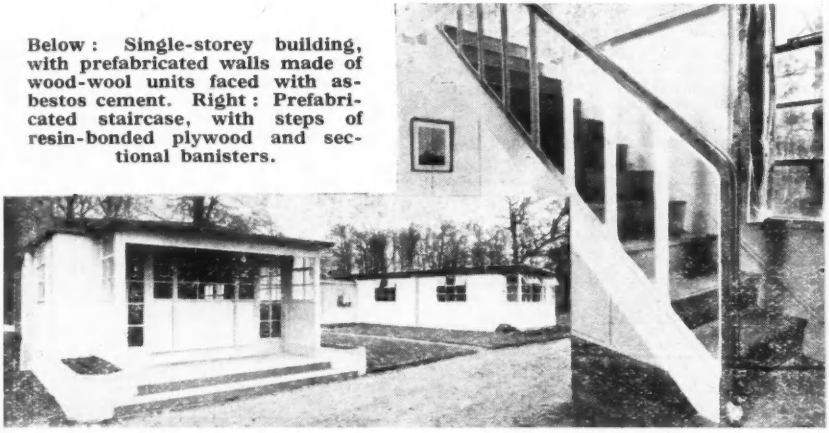
5. Licences will not, in future, be necessary for the export of the following drugs except in respect of destinations to which the export of all goods is controlled: adrenalin and its salts; atropine and its salts; benzocaine; camphor; cantharides; cantharidin; chaulmoogra, oil of; cinchophen; ephedra; ergometrine and its salts; ergot; ergotamine and its salts; ergotoxine and its salts; gentian; leptandra; liquorice root; male fern; menthol, natural and synthetic; methyl salicylate; nikethamide; parathyroid; pituitary gland and its extracts; podophyllin resin; pregneninolone (anhydrohydroxy progesterone); procaine and its salts; progesterone; santonin; scilla (squill); slippery elm bark; sodium salicylate; thyroid; and witchhazel, distilled.

6. Iceland is removed from the list of countries to which the export of all goods is prohibited. The above amendments (Nos. 3-6) are operative from March 28.

Factory-Made Houses

New Materials for Prefabrication

THE shortage of housing accommodation at the end of this war will be so obviously acute that the need for political slogans, like the notorious "homes fit for heroes," will scarcely arise. It will, however, be necessary—it *is* necessary, indeed—to study all forms of building construction, and to discard none merely on the ground of novelty. Chemical science and technology have had a hand in developing many new constructional materials, and these, coupled with new working methods, may go a long way towards easing the situation.



Below: Single-storey building, with prefabricated walls made of wood-wool units faced with asbestos cement. Right: Prefabricated staircase, with steps of resin-bonded plywood and sectional banisters.

In the recent housing debate, Mr Alfred Bossom, M.P., introduced the fact that to house the large number of workers concerned in the great Tennessee Valley hydro-electric scheme prefabricated houses were factory-made in two parts and fitted together on the building site. Erecting time was four hours. The British Government is already committed to a policy that includes provision for emergency structures to be built. The Prime Minister has now announced that prefabrication will play a great part in immediate post-war years.

Recently, a representative of THE CHEMICAL AGE had the opportunity of inspecting some prefabricated buildings put up by Uni-Seco Structures, Ltd., of 6 Wood Mews, Park Lane, W.1. An example of a single-storey structure made of prefabricated units is shown in our illustration; actually, this particular building is being used for experimental purposes, but its general appearance is nevertheless quite pleasing. Our representative also saw a pair of two-storey houses built by the same method. Each house has three rooms on each floor. The erection time of these two houses was about 730 man-hours, equivalent to under two weeks for an erecting team of eight men. Such speed of erection is made possible by the use of building units considerably larger than the units of traditional construction. Instead of bricks, units measuring 7 ft. 4½ in. by 3 ft. 2½ in. go to make up the walls; these wall units consist of a rigid insulating core of wood-wool bonded with cement, faced on both sides with flat asbestos cement sheets and enclosed on all four edges by a light timber frame. It is claimed that such units are equivalent, from the point of view of heat insulation, to an 11 in. brick non-cavity wall. External joints between units are treated with a mastic compound to make them weatherproof. The floor units are constructed of resin-bonded plywood; the largest floor unit, with a span of 12 ft. 9 in., can easily be handled by two men, as can all other units and components in this system of building. The standard beams, columns, and eaves are also of stressed skin construction and built up of resin-bonded plywood firmly keyed to diaphragm spacing members. Members of the chemical industry will be interested in the extensive use that is being made of synthetic resins.

The firm's experience shows that plywood glued with hot-pressed synthetic resins is a durable weather-resisting material immune from attack by vermin and fungus. In the

past the use of plywood has not always proved satisfactory, as the glues available were not resistant to weather or attack by fungi: a glue conforming to such a specification as D.T.D.484 is found to be thoroughly effective. Incidentally, it may be noted that if this technique of floor construction is adopted, the valuable experience gained by the chemical industry in connection with aircraft assemblage during this war can be put to good use.

Other interesting points about the buildings are as follows. Electric wiring and service pipes are easily installed and concealed in the ducts provided between and at the end of the floor units. Plumbing is by a prefabricated vertical duct, passing from the kitchen through the first floor and connecting with a horizontal duct carrying the service pipes. The kitchen is equipped with fitments, built up of individual units, measurements of which are based on the firm's unit modulus.

Although classed as demountable, these buildings are regarded as being permanent if required. Their demountable nature is a valuable feature in that it enables a temporary structure to be taken down and its units used again. During the last two years about 50 million cubic feet of "Seco" buildings have been erected on over 600 sites in Britain (*e.g.*, on airfields). With reasonable care, wastage in dismantling does not exceed 10 per cent. of the value of the buildings.

To the chemist the main interest of this building system lies in the new uses being found for chemical products such as synthetic resins. In connection with the wall units particularly, there is abundant scope for experiment, in that the asbestos-cement faces and the wood-wool core could be replaced by other materials. The chemist is well qualified to suggest what alternatives are possible, and it is interesting to reflect that some of the alternatives may well be found among newly-developed products such as foam glass.

The method of construction would be suitable where extra laboratory, workshop, or storage accommodation is needed. The use of interchangeable units makes extension of such premises a relatively simple matter. It is impossible to give a fair comparison at the present time between the cost of Uni-Seco buildings and structures built with traditional materials; for house construction it is about two-thirds that of brick building, with the probability that the ratio may be reduced to about one-half.

New Building Materials

Research in the United States

THE mission sent by the Minister of Works to study American techniques of house construction has published a report under the title of "Methods of Building in the U.S.A." (H.M.S.O., 4d.). This stresses the part that science plays in the American building trade, and gives a hint of the potentialities of new building materials now being developed. American designers, it appears, are well aware that many buildings of no great age are threatened with obsolescence as new equipment and new designs are perfected, and they show a tendency to assume that in view of the rapidity of scientific development and social change, future generations will demand to live and work in buildings evolved by themselves and appropriate to their own times. Hence, buildings should be designed strictly for their immediate purpose, in the belief that a limited life for a building may be an advantage rather than the reverse. American manufacturers are, therefore, prompted to produce new materials fulfilling the general requirements of serviceable building, but costing less than traditional materials and not necessarily having the same length of life.

One line of experiment is yielding composite materials, each of which combines the functions of two or more existing materials. Lightweight aggregates are further developed in the U.S.A. than they are in Britain: there are, for example, ten plants making foamed slag, and eight plants producing expanded clay or shale aggregate known as Haydite. The cement-gun process has been used for repairing buildings damaged by earthquake shock, and it is suggested that the technique could be an economical way of repairing damage due to bombs. Oil, chemicals, cement, and other agents are successfully used in America for stabilising soil when making roads; the mission urges that the use of these processes should be further investigated in Britain with a view to adoption during, as well as after, the war.

Other interesting items the mission notes are: double-glass windows, made by the Libbey-Owens-Ford Co., that give greater heat insulation; foam glass, used in the U.S. Navy for refrigeration purposes; microporite, a product of silica and lime; extension of the use of plywoods bonded with synthetic resins; the employment of extruded plastic pipes; and a building material made from sawdust and other wood waste, and said to be inert, fire-resistant and waterproof.

The mission was impressed by the variety of equipment in the research establishments they visited. Apparently, however, America has no institution precisely comparable to our Building Research Station; therefore the exchange of scientific papers on building work between the Ministry of Works and the D.S.I.R. on the one hand, and certain U.S. Government agencies on the other, is strongly recommended.

Metallurgical Section

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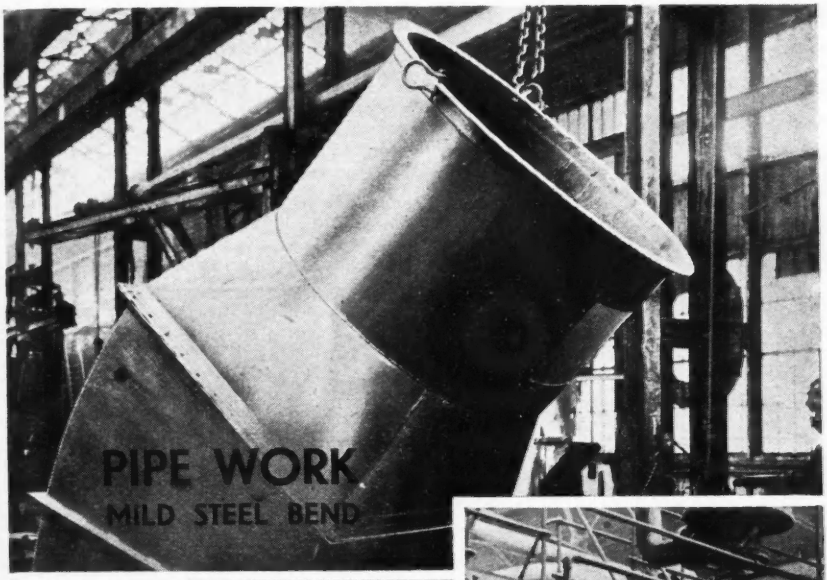

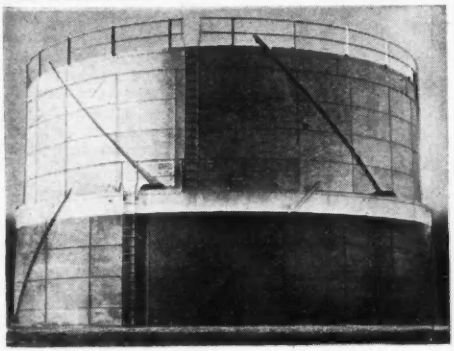

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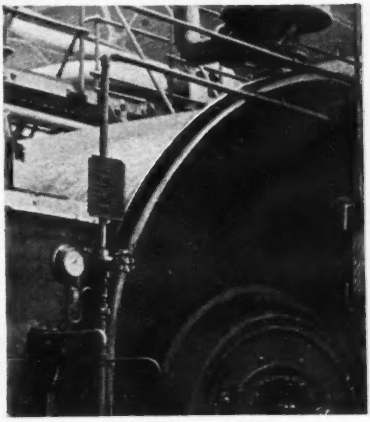

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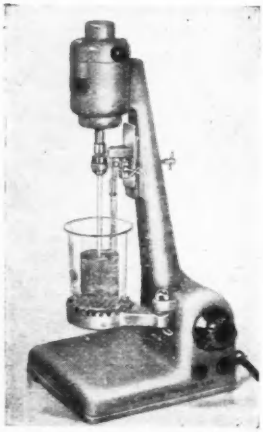

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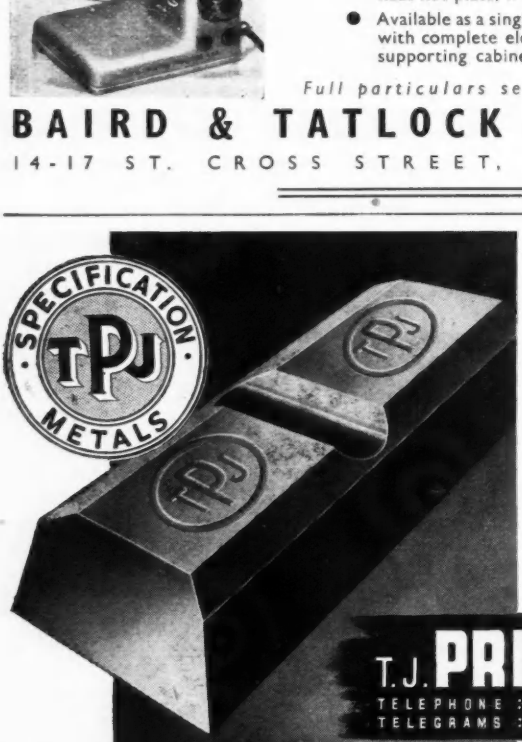

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Metallurgical Section

April 1, 1944

The Metallurgy of Molybdenum

Its Importance in Iron and Steel Alloys

by L. G. WHYBROW PALETHORPE. F.I.C.

ALTHOUGH the element molybdenum has been known to science for more than 160 years, its commercial use is of recent origin; not until the turn of the present century were its metallurgy and its effect on iron and steel seriously investigated. The production figures[1] serve very well to demonstrate the increasing interest in it from this time on. In 1900, the annual output of molybdenum was about 22,000 lb.; in 1941 it was 35,000,000 to 40,000,000 lb.; since then, the war has caused further increases in production to cope with current demands.

Natural Sources

Molybdenum occurs in nature,[1] in combination with sulphur, oxygen, lead, and calcium, as molybdenite (MoS_2), wulfenite ($PbMoO_4$) powellite ($CaMoO_4$), and molybdite ($2Fe_2O_3.6MoO_3.15H_2O$), the last two of which are not regarded as commercial sources of molybdenum. In spite of the fact that molybdenum is often referred to as one of the "rarer" elements, molybdenite is a relatively common mineral. More than 99 per cent. of the world's reserves and present production are from this source, which is mined principally in the United States, Mexico, Norway, French Morocco, and Chile. It is a soft, dark mineral, shiny and galena-grey, occurring in tabular six-sided crystals. It is easily recognised when in large crystals, but when fine-grained it can easily be mistaken for graphite or other black metallic mineral. Considerable experience is, therefore, usually required to identify molybdenite in the latter case.

Wulfenite is usually found in oxidised lead deposits in various parts of the world. Until the end of the 1914-18 war it was an important source of molybdenum, but it is now of only minor importance. Increased production and the dwindling reserves of wulfenite have together led to a greater use of molybdenite, so much so that after the present war it is doubtful whether further exploitation of wulfenite deposits will be worth while. It is a non-metallic mineral, usually yellow or orange in colour, but occasionally it may be white, red, or grey. The chief deposits of commercial interest are in South America, Spain, North Africa, Central Europe, and Russia.

In the process of extraction, molybdenite is first of all concentrated by flotation. It is then roasted and purified. Molybdenum metal may be prepared, from the oxide produced, in one of the following ways, each of which gives a product slightly different in properties: (a) The reduction of molybdenum trioxide with hydrogen yields a grey metallic powder, which may be handled by the powder-metallurgy technique to give bars of a brittle nature; (b) the reduction of molybdenum trioxide with carbon yields a grey powder, impure owing to the presence of carbon (this product is very hard but is low in specific gravity); (c) the reduction of molybdenum trioxide with metallic calcium; (d) the electrolysis of calcium molybdate or molybdenum chloride. The last two methods yield a much purer metal than the first two. It is not often, however, that the metal itself is required commercially. The iron and steel industry, by far the largest users of molybdenum, require it in one of the following forms for addition to molten alloys: (1) molybdenum trioxide in briquette form; (2) calcium molybdate, containing 45-50 per cent. molybdenum; (3) ferro-molybdenum containing 55-70 per cent. molybdenum.

Properties and Uses of Molybdenum

Pure molybdenum is a silvery-white metal closely resembling steel in colour. Its specific gravity is 10.0 and its melting point is as high as 2600°C. It is both malleable and ductile, being rather softer than mild steel. It may be forged at a full red heat, being, in this respect, softer and more easily worked than tungsten. It is resistant to atmospheric corrosion, and to oxidation up to about 600°C., above which temperature it combines readily with oxygen to form a yellow powder, molybdenum trioxide (MoO_3). It is resistant to the action of many solutions, including cold hydrochloric and sulphuric acids. It is a good conduc-

[1] J. W. VANDERBILT, "The Occurrence and Production of Molybdenum," abstracted in *Steel*, November 9 and 16, 1942.

tor of heat and electricity. As would be expected, these properties are in some measure passed on to the alloys of molybdenum.

Chemical Uses

Apart from its use in the iron and steel industry, molybdenum is used in small amounts for a variety of purposes. The chemical industry requires molybdenum pigments for use in printing inks, paints, lacquers, etc. A recent development in this field is a new molybdenum dye particularly useful to the fur trade. In the oil industry, molybdenum-containing catalysts are being used, particularly in the distillation of high-grade spirit. Metallic molybdenum has a very limited application, confined largely to the electrical and radio trades where it is used for high-temperature work and for radio receiving tubes.

One or two alloys of molybdenum are worthy of mention. Osmiridium, used for tipping gold pen-nibs, has been occasionally substituted by an alloy containing 60 per cent. molybdenum plus varying amounts of platinum, tungsten, copper, and nickel. "Toncan," an alloy of molybdenum, copper, and iron, has been used in the chemical industry for making apparatus. "Contracid" is a nickel-chromium-iron alloy to which 10 per cent. molybdenum has been added.

Iron and Steel Industry

In the iron and steel industry molybdenum is used as an alloy addition in both structural and tool steels and in cast iron. Its action is confined to improving the quality of the base metal. Unlike vanadium and titanium, molybdenum is not a cleansing agent as well as an alloy addition. In steels, it is generally in solid solution in the ferrite matrix, but in the presence of carbon, molybdenum may form a complex carbide. It confers on steels several advantageous properties, of which the following are the most important. In the first place, its presence raises the Ac3 critical point on heating. This is due mainly to the stability of the complex carbide referred to. On cooling, however, molybdenum lowers the Ar3 critical, with the result that milder quenching media may be used to give a desired hardness. In consequence, molybdenum-bearing steels are very good when deep hardening is essential. The extent of this deep hardening quality is emphasised by the fact that molybdenum is second to carbon alone in displaying this quality.

Molybdenum additions to steels cause the retention of their strength at elevated temperatures to a marked degree. This, of course, improves their resistance to creep. Another aspect of this property is that since molybdenum-bearing steels retain their hardness at elevated temperatures, higher tempering temperatures may be used as compared with other steels. Thus for a given hardness figure there will be a greater relief of quenching stresses, which will result in improved Izod impact values (*i.e.*, resistance to shock will be higher). Temper-brittleness, a phenomenon exhibited by alloy steels, particularly those of the chromium and manganese types, is offset by the addition of molybdenum to them. If enough is added this weakness may be virtually eliminated. In practice, up to 0.7 per cent. molybdenum is required for the most susceptible steels. The presence of molybdenum in steel very often improves its machinability, especially at the higher hardness values (*i.e.*, above 250 Brinell). For example, it is a fact that a nickel-chrome-molybdenum steel is easier to machine than a nickel-chrome steel of the same mechanical properties. Molybdenum is added to the stainless steels both to improve resistance to corrosion and to prevent intergranular corrosion.

Types of Molybdenum Steel

Molybdenum is invariably a constituent of nitriding steels,[2] not because of its special affinity for nitrogen but mainly on account of its property of eliminating temper-brittleness. In carbon case-hardening steels, too, it has been used extensively. The standard steels En 34 and En 35, for example, call for 1.5 to 2.0 per cent. nickel with 0.20 to 0.30 per cent. molybdenum.

As a constituent of the structural alloy steels, it is added in combination with nickel, chromium, manganese, and silicon, either together or separately, to produce alloys with specific properties.

In the tool steel class, molybdenum is used both for non-deforming die steels and for high-speed steels. Alloys of the latter series are particularly interesting at the present time, for many of us have made our first acquaintance with them as substitutes for the customary high-tungsten steels. As early as 1900, it was known that molybdenum could be considered as a substitute for tungsten in high-speed steels. In practice, it was established that one part of the former produced the same effect as two parts of the latter. However, the early molybdenum alloys exhibited a tendency to surface softness due to decarburisation in hardening, and commercial acceptance of these steels was retarded in consequence. Since then much work has been done, especially in the United States, and suitable alloy combinations have been devised. That they have been successful is amply borne out by results obtained in this country in the last two or three years. They are still prone to slight surface decarburisation dur-

[2] L. G. WHYBROW PALETHORPE, "Nitriding," *Chem. Age*, 1944, *50*, 1279, pp. 11-14.

ing hardening, but with modern apparatus and technique this can be virtually eliminated. The 6 per cent. molybdenum/6 per cent. tungsten steel, commercially known as "66" substitute high-speed steel, was one of the first of these alloys to be introduced, but since then others have come along, containing, in addition to molybdenum and tungsten, varying amounts of cobalt, chromium, and vanadium.

Molybdenum has been used in cast iron for a number of years, mostly in conjunction with nickel and chromium, either jointly or separately. Since it is neither a graphitiser nor a strong carbide former, it may be added to all types of iron with beneficial results. The improved mechanical properties obtained are attributed to a refining effect of molybdenum on the ferrite matrix and to an improvement in the size and distribution of the graphite. Molybdenum tends to offset the effect of mass in cast iron as it does in steel, with the result that large sections display uniform hardness throughout. In spite of the improved physical properties, the machinability of these irons is not impaired. The bulk of these high-duty irons containing molybdenum is used for castings for the automobile, diesel-engine, and machine-tool trades, when tensile strengths ranging from 15 to 30 tons/sq. in. are required.

The Hungarian Aluminium Industry

Rapid Increase in Bauxite Production

IT is both interesting and important to watch the development of the production of bauxite in Europe, as this mineral is the only major non-ferrous raw material of which Europe has abundant reserves. Germany itself has no extensive bauxite deposits and the German aluminium industry is entirely dependent on imports. By the occupation of Central and S.E. Europe, Germany got control of the bauxite deposits in Hungary, Yugoslavia, Greece, and Slovakia, in addition to those in France. It is well to remember that Germany tried to establish, prior to this war, emergency production schemes in which the German technologists attempted to utilise low-grade clays and phonolites for the production of aluminium. These schemes are now suspended, in view of the vast deposits now at the disposal of the German war machine.

The largest reserves of European bauxite are on Hungarian territory. They have been estimated at well over 250 million tons, and further prospecting, intensified during the last few years, reveals a yet greater tonnage. The neighbouring Yugoslav deposits amount to 100 million tons, whereas France, originally the largest European producer of bauxite, but now superseded by Hungary, has deposits amounting to only some 60 million tons, equalling those of Greece. According to recent German estimates, the Rumanian deposits can be reckoned at about 40 million tons and the Italian at 20 million tons.

The German Press reported last year that the Bauxite Trust Company in Zurich, operating mines in Hungary, Croatia, Italy, Slovakia, and Rumania, increased its capital from 11 million to 13.5 million Swiss francs. This company has stated that a further 24 million Hungarian pengö will be required to extend the existing mines, open new deposits, and increase the output of factories producing aluminium products. The company was founded in Hungary in 1917 with only 3 million pengö capital which, after the reorganisation of Hungary in 1918, was increased to 6.5 million pengö, and in 1932 to 30 million pengö. The other Hungarian company, Aluminiumerz Bergbau & Industrie A.G., Budapest, merged with the Bauxite Industrie A.G., Budapest, in 1941, to form the company called Danubian Industry of Aluminium Production, with a capital of 8 million pengö, and under the patronage of the Bauxite Trust Company. Its capital was later raised to 35 million pengö, this sum being divided equally between the Hungarian State, the Vereinigte Aluminiumwerke of Berlin, and the Bauxite Trust Company, Zurich.

It is important to realise the rapid rise of production of bauxite in Hungary which in 1933 amounted to 66,200 tons; 1934, 185,000; 1935, 245,000; 1936, 368,000; 1937, 510,000; 1938, 521,000. These figures differ somewhat from the American statistics given in the "World's Production of Bauxite," but the increase is of the same order, though it is carried on to 600,000 tons in 1941.

The bauxite mine at Gant is the richest in Hungary, not only in quantity but also in quality. The located deposit is estimated at 120 million tons. The Bakonyi deposits require deeper mining. The new locations in the vicinity of Iszkaszentgyorgy and Guttaman are very promising; mining was started in autumn 1940, and a new railway branch, 7 km. long, constructed. The mines in the Bihar Komitat (Siebenburgen), which belonged to the Alumina Societate Anonima Miniera, Bucarest, were transferred to Hungary from Rumania under the Vienna Axis decision and the Hungarian Aluminium Industrie A.G. has resumed operations there.

The export of the Bauxite Industrie A.G., Budapest, formerly considerable, fell

sharply in 1941 and has since almost ceased, as the two Hungarian aluminium works demanded practically the whole output of bauxite for their production of aluminium, while the aluminium plant at Magyarovar still requires more raw material. A third plant is to be built by the two amalgamated Hungarian companies. The recent increase in the capital of the joint concern was specially earmarked for the construction of a new plant near Ajka, with an annual capacity of 20,000 tons of alumina, and 10,000 tons of aluminium, together with the light metal alloy works at Stuhlweissenburg.

Briquetting Iron Ores

An Aid to Furnace Operation

A PROCESS for briquetting soft iron ores, adding no binder which might interfere with proper furnace operation, is recorded in a recent issue of *Engineering and Mining Journal*. The process normally consists of four stages, the first being drying to eliminate excess moisture. This is best done while the material is loose, especially as it can be screened more easily after drying. Screening is the second step. The material is then compacted into briquettes by using high pressures, and finally a short exposure to intense heat produces case-hardened briquettes.

The initial purpose of the experiments carried out several years ago was to produce a substitute for high-grade lump ore for use as an oxidising agent in the open-hearth furnace, or for open-hearth charging. The briquettes may also make an excellent blast-furnace charge, as they appear to offer at least four advantages over soft ore. They permit a freer circulation of the blast through the charge, reducing the smothering effect of loose soft ore; they reduce or eliminate ore-dust losses; they permit a greater quantity of iron to reach the hearth, because compacted briquettes have a high specific gravity; and they require no drying in the blast furnace. In short, it should be more efficient and economical to dry the ore before charging than to use heat within the blast furnace for this purpose.

In the experiments the soft ore was first dried and then screened through 100 mesh. For briquetting, various pressures were tried ranging up to over 25 tons/sq. in. In case-hardening, higher temperatures gave the best results, although temperatures above 1316° C. are unnecessary. A 40-second exposure to the effective temperature range was adequate to produce case-hardening about 3/32 in. deep, and partial recrystallisation throughout the mass, which is quite compact although slightly porous. By controlling the rate of feed and temperature range, the physical quality of the briquettes is readily controlled. The processing from dry ore or from ore material without excess moisture to finished briquettes should occupy only a matter of minutes, as the whole process can be carried out on a continuous mass-production basis.

Iron and Steel Research

New Association Approved

THE Council of the British Iron and Steel Federation has approved a scheme, which had been prepared by a committee set up by Sir James Lithgow, for the formation of the British Iron and Steel Research Association, which will take over the work of the Iron and Steel Industrial Research Council. The constitution of the new association provides for collaboration with the Iron and Steel Institute, with the right of nomination of members of the council of the new association. It is understood that these will be scientists not connected with the industry but engaged in related fields of work. The Federation will nominate members to represent the different departments of the industry—scientific, technological, and directive.

The scheme adopted provides for an annual expenditure of any amount which the Council of the Research Association may find necessary for the work required; and authority to expend up to £250,000 annually without further reference to the approval of the Federation.

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LETTER TO THE EDITOR

Fire Extinguishing

SIR,—I should like to call attention to certain points in the article "Fire Risks and Post-War Industry" by Mr. Creevey in your issue of March 18, for although in many respects this article is most valuable there are one or two statements which are definitely wrong.

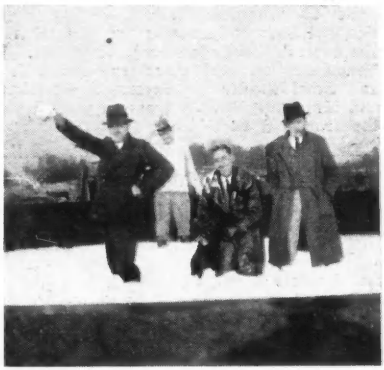
In the second column of page 271, for example, it is implied that stirrup pumps can be used to *extinguish* incendiary bombs. This statement is somewhat vague, as it does not specify the material contained in the bomb. The extinguishing action of water on phosphorus is well-known, but the effect of water on burning or molten magnesium is a very different matter.

A little further on, mention is made of the application of "foam" to inflammable liquid. Here, again, it is necessary to particularise. Chemical foam, with its tendency to disintegrate under heat, may well cause a hot liquid to spread; Mechanical Air Foam, on the other hand, has a most

Mechanical Air Foam flowing over the burning liquid in a petrol tank.

valuable blanketing effect, as the accompanying illustrations will show. Both types of foam must be applied correctly.

In the next paragraph it is not a question of vagueness, but a matter of definite error that I have to criticise. I can say, from tests which I have carried out personally, that powdered talc does *not* provide an efficient extinguishing agent for finely-divided metals such as powdered magnesium or aluminium, nor is it effective in the case of sodium or potassium fires. Fires caused by these agents are efficiently extinguished by "DX" Powder and up to now no other mixture or material has been of the slightest use for this purpose, a point which has also been proved by tests over a number of years, and the powder will also deal efficiently with burning phosphorus, although in this case it is no more efficient than a



Petrol tank completely covered by Mechanical Air Foam. The foam clings to the hand even in a high wind.

covering of water. Zinc dust fires are in a particularly dangerous group and cannot be extinguished or even controlled by powdered talc.

Research and development have proceeded in the science of fire-extinguishing as in other sciences, and I think it only right that your readers should be kept up to date in a matter so important as this.—Yours faithfully,

for DURSTON, LANG & CO., LTD.,
G. HAROLD DURSTON,
Technical Director.

March 22, 1944.

Personal Notes

PROFESSOR V. C. ILLING, professor of oil technology, Imperial College of Science and Technology, London, has been awarded the Murchison Medal of the Geological Society.

Prizes were presented to MR. KURT SACHS, MR. G. F. BIDMEAD and MR. A. W. MATTHEWS, at the meeting of the Birmingham Metallurgical Society last week, for having written the best student essays.

MR. HERBERT PRIOR, who until the outbreak of war was on the staff of the I.C.I. Central Laboratories at Widnes, has been granted a commission in the Royal Engineers. He has had nearly five years of service, including two in West Africa.

At the annual meeting of the Nottingham section of the Society of Chemical Industry, DR. H. H. BARBER was re-elected chairman, MESSRS. H. CALAM and A. D. POWELL vice-chairmen; MR. C. F. WARD hon. treasurer,

and MR. W. T. T. AINSWORTH hon. secretary.

The British delegation to the forthcoming I.L.O. Conference at Philadelphia will comprise 23 members, including SIR JOHN FORBES WATSON (director of the British Employers' Confederation), MR. H. S. KIRKALDY (general secretary of the Iron and Steel Trades Employers' Association), and MR. JOHN BROWN (general secretary of the Iron and Steel Trades Confederation).

DR. RICHARD ALAN MORTON, D.Sc., Ph.D., F.R.I.C., a Meldola medallist, is the new Johnston Professor of Biochemistry at Liverpool University, in succession to Dr. H. J. Channon, who resigned last August to take up an industrial research appointment. Dr. Morton is a spectroscopist of international reputation, and the development of vitamin chemistry owes much to his original researches.

SIR HENRY DALE, president of the Royal Society, has accepted the chairmanship of the Penicillin Committee of the Ministry of Supply. He succeeds Mr. Arthur Mortimer, who continues to be a member of the committee and acts as vice-chairman. This committee, which was set up in October, 1942 (THE CHEMICAL AGE, 1943, 48, p. 485), is concerned with the production of the drug, and includes representatives of penicillin manufacturers.

ALDERMAN E. O. GLOVER, of Overton and Runcorn, for many years a prominent personality in the chemical industry of Merseyside, has been elected vice-chairman of Cheshire County Council. Mr. Glover started his connection with industrial chemistry at the Castner-Kellner Works, becoming works manager and later a director. After the formation of I.C.I., he was elected a director in the General Chemicals Group, and, until his retirement early in 1939, served as personnel director.

Obituary

MR. A. R. HUDSON, manager of Sadler and Company's chemical works, Middlesbrough, until his retirement in 1926, has died at Redcar, Yorkshire. His service with the company extended over 55 years.

MR. DAVID Y. B. TANQUERAY, a director of Baker Perkins, Ltd., chemical and general engineers, Peterborough, died in London on March 21, aged 47, following a major operation. Mr. Tanqueray joined Baker Perkins in 1924, when the firm of Aublet Harry & Co., laundry engineers, was absorbed, and he was mainly associated with the laundry-machinery side of the business. He was appointed a director in 1938, and in 1941 he was seconded to the Ministry of Supply as Deputy Director of Weapon Production. He resigned that position at the end of last year owing to ill-health.

MR. HENRY WULFF KINNERSLEY, M.A., B.Sc., F.R.I.C., died at Keynsham, Somerset, on March 16, aged 66. A pupil of Sir Ernest Cook, he studied chemistry also at the Merchant Venturers' Technical College, Bristol, and later at King's College, London. He took his A.I.C. in 1900, gaining his F.I.C. five years later. From 1906 to 1913 he served as assistant to the examiners of the Institute. Before the last war he was for a time chemist to Blythe & Platt, the Watford firm of polish manufacturers. From 1915 until the end of 1919 he served as an officer of the R.A.O.C., being stationed at Cape Town. On his return to England, he went to Lincoln College, Oxford, and obtained his B.A. and B.Sc. Specialising in organic chemistry and biochemistry, he continued to work at Oxford as assistant to Professor R. A. Peters in the department of physiology and biochemistry. During this war he joined the chemical laboratory of the Radcliffe Infirmary, Oxford.

General News From Week to Week

The Birmingham Jewellers' Association is considering the possibility of setting up a research department for the trade.

A research chemist, Dr. R. N. Haward, has collaborated in writing the feature programme entitled "Plastics at War," which the B.B.C. is to broadcast in the Home Service at 6.30 p.m. on April 4.

The annual general meeting of the Industrial Catering Association will be held on April 29, at 2.30 p.m., at Gas Industry House, Hyde Park Corner S.W.1. It will be preceded at 10 a.m. by a meeting of the National Council.

The staff of the Ministry of Fuel and Power have contributed nearly £12,250 to the Red Cross Penny-a-Week Fund.

A new plant making basic slag was formally inaugurated by the Secretary of State for Scotland at Messrs. Colville's Clydebridge Steel Works, Rutherglen, on March 31.

Platers and Stampers, Ltd., of Richmond, Surrey, have had their articles of association altered to give them the right to manufacture articles with the aid of plastic materials.

The Gas Research Board has just published the 33rd report of the Refractory Materials Joint Committee, on which are represented the Gas Research Board and the British Refractories Research Association. In the main the report consists of an account of the investigations carried out by the latter organisation on behalf of the committee.

The name of Sulzer Brothers, of Winterthur and elsewhere in Switzerland, is deleted from the black list of persons in neutral countries with whom dealings are illegal. This is in accordance with the Trading with the Enemy (Specified Persons) (Amendment) (No. 3) Order, 1944 (S.R. & O. 1944, No. 253), by which 100 new names are added to the black list.

Acetone is being produced in Ireland by the distillation of wood, but the production capacity is limited. The Emergency Research Bureau has, therefore, worked out a process, based on known methods, by which acetone can be produced from alcohol. The Bureau is also actively interested in plant-scale experiments on the production of ether from alcohol.

The preparation of photo-engraving glue is being investigated by the Eire Emergency Research Bureau. The glue normally used is a highly refined fish glue made from the skins of certain fish, notably the cod. There is no dried fish industry in Eire to provide this offal and it has been necessary to collect the requisite skins direct from retailers. A suitable manufacturing process is now being operated on a small scale by a commercial interest, and the surplus production is being sold as an adhesive.

The full text of the addresses delivered at the recent conference on "London's Stake in Overseas Trade" has now been published in pamphlet form by the London Liberal Party (8 Gayfere Street, S.W.1), price 1s. Many of the papers, including those by Lord Leverhulme and Mr. J. D. Wolff, late chairman of committee, London Metal Exchange, were read by the authors in their character as independent experts on the business life of the city and port of London, and are not necessarily associated with the Liberal Party.

The Red Cross is appealing for educational books for prisoners of war. Chemistry books that are urgently needed include the following: Lowry, *A Historical Introduction to Chemistry*; Mee, *Physical Chemistry*; Mellor, *Modern Inorganic Chemistry*; Sherwood-Taylor, *Inorganic and Theoretical Chemistry*, and *Organic Chemistry*; Thorpe, *Essays on Historical Chemistry*. Any recent books on the history of chemistry are welcome, and should be sent to Educational Books, Prisoners of War Department, British Red Cross Society, New Bodleian, Oxford.

A record amount of scrap metal was consumed during 1943 by the iron and steel industry, according to Mr. H. Secker, Director of Scrap Supplies. He further stated that present special supplies were getting short, and merchants would have to help in finding new sources. The steel industry was going to demand a better standard of scrap in the future.

Food samples examined by analysts in 1942, the last year for which complete figures are available, numbered 116,055, of which 8800 or 7.6 per cent. received adverse reports. In the years 1938, 1939, 1940 and 1941, the total number of samples examined and the percentage of unsatisfactory samples were respectively 143,100 and 5.7 per cent.; 139,958 and 5.4; 134,193 and 6; 123,352 and 7.8.

A fine of £1400, with £50 costs, was imposed at Liverpool, on March 16, on the Huddersfield firm of chemical manufacturers, L. B. Holliday and Co., Ltd., for having exported metachrome mordant to Australia, New Zealand and Eire without the necessary licences. It was stated that in 18 months chemicals to the value of £7000 had been exported. Defendants pleaded that there was no wilful intent to evade the regulations.

The Control of Non-Ferrous Metals (No. 14) (Copper, Lead and Zinc) Order, 1944 (S.R. & O. 1944, No. 265), which came into force on March 20, increases the maximum price of Admiralty gunmetal scrap of the quality commonly known as "88-10-2" from £74 10s. to £77 per ton, ex works. The increase maintains the relation between the maximum price of the scrap and the value of the contained metals, and is consequent on the recent increase in the price of tin.

The Export Licensing Department (Board of Trade) is moving from Inveresk House, 346 Strand, London, W.C.2, and Alexandra House, Kingsway, London, W.C.2, to 3 Bank Buildings, Princes Street, London, E.C.2, and Stafford House, King William Street, London, E.C.4. After March 30, all communications should be sent to Export Licensing Department, Board of Trade, 3 Bank Buildings, London, E.C.2. (CLErkenwell 4373).

Foreign News

The establishment of a factory for the extraction of vitamin-containing fish oils at Las Palmas, Canary Islands, has been authorised by the Spanish Government.

The new plant of the Owens-Illinois Glass Co. at Waco, Texas, has begun operations. Its initial capacity is 300,000 bottles a day, giving work to about 300 persons. The factory is built on a 52-acre site.

The American Standards Association recently celebrated its 25th anniversary.

Eastman Kodak Co., Rochester, New York, is said to have entered the optical glass field permanently. The company is reported to be the only manufacturer in the world of a non-silica product.

The defoliation of cotton plants by chemical means is being studied by scientists of the American Cyanamid and Chemical Corporation. Leafless cotton would enable the growers to use mechanical harvesters instead of hand labour.

Fish-liver oil is being extracted in New Zealand from shark, elephant fish, groper and swordfish, 2s. a pound being paid for shark livers, and slightly more for swordfish livers. A first-class plant is operating at Auckland, and a smaller one at Wellington.

All cartel agreements will have to be registered in America if the new Bill introduced by Senator O'Mahoney becomes law. Processes, patents, trade marks, licences, and even assignments, are covered in the draft bill which has been referred to the Senate Judiciary Committee.

The explosives plant at Bergerac, east of Bordeaux, was heavily damaged by the R.A.F. on March 18. The Poudreric Nationale Works at Angoulême was visited by Lancasters on March 20, the nitrocellulose sheds that extend for half a mile being the main target.

Transport of acids on American railways led to 204 accidents during 1942, states the annual report of the Chief Inspector of the U.S. Bureau of Explosives; 21 persons were injured as a result, and the damage done amounted to $53,000. This low figure is due to close supervision by the Bureau of Explosives and the educational work of the Manufacturing Chemists' Association.

The creation of silver babbitt is an outgrowth of the shortage of tin. The Battelle Memorial Institute, Columbus, Ohio, after exhaustive research to find a babbitt metal comparable to tin-base babbitts, found the answer in silver alloyed with a properly balanced lead-base babbitt. This new silver babbitt metal is produced by National Bearing Metals Corp., St. Louis, Mo.

Four new plants for wood distillation have been authorised by the Spanish Government. None is yet in operation. Carbones e Industrias Maderas S.A., Barcelona, will have an estimated output of 240 metric tons a week. Other plants in the Barcelona area will be Jacinto Dubarri Serra and Saltor Modolell, San Celoni. Sociedad Española Industrias Químicas-Farmacéuticas, Madrid, expects to produce 2000 metric tons weekly. This factory, which is the largest of the new enterprises, will collaborate with I.G. Farbenindustrie. The only producer at present is "El Yrati," S.A., Pamplona, with an output of about 800 tons of pitch per week.

A new heat-treated glass has been perfected by the Pittsburgh Plate Glass Co. of America to replace scarce metals in dehydrating equipment. The glass is said to be four times as strong, flexible and tough as ordinary glass of equal thickness, and withstands constant temperatures up to 650° F., as well as sudden fluctuations.

Dichloro-iso-propyl ether has been tested in laboratories of the Dow Chemical Co. of America, and is found to be a suitable substitute for benzol in paint removers, an effective soil fumigant for controlling wireworms, and a good general industrial solvent. It is said also to be of value in removing oil from paraffin waxes.

Conversion of the Nova Scotia coal industry to the manufacture of synthetic coal products may be the means of assuring the province a better position in post-war trade, according to Mr. A. Stanley Walker, president of King's College, Halifax. He pointed out that the transport of coal as fuel would always be difficult for them, whereas synthetic products were comparatively light, and less costly to transport.

A new War Department building in Washington will be protected from incendiary bombs by vermiculite, a mineral which is becoming an important factor in modern warfare. Vermiculite has already been supplied to make bombproof decks for military installations. Because of this vermiculite production in the United States is proceeding at a record rate, new deposits being opened.

Bauxite mine production in the United States in 1943, at 7,026,040 short tons, was more than double the previous record of 1942 (2,966,241), and was almost seven times the 1941 total (1,049,496), according to preliminary figures compiled by the U.S. Bureau of Mines. Domestic production and imports in 1944 are expected to be considerably less owing to the recent cutback in alumina and aluminium production. Industrial consumption of bauxite in 1943 exceeded that in 1942 by 89 per cent., and is estimated to have totalled 5,340,600 tons. The chemical industry accounted for 179,900 tons or 3.4 per cent.

Forthcoming Events

The **Institute of the Plastics Industry**, North-western Section, meets on **April 1**, at 2 p.m., at the Engineers' Club, Albert Square, Manchester, to hear a paper by Mr. H. R. Barber, of the Austin Motor Co. on "Plastics and the Automobile Body."

Mr. H. Courtney Bryson will give a paper on "Wetting," on **April 1**, at 2.45 p.m., at a meeting of the Northampton Group of the British Section of the **International Society**

of **Leather Trades' Chemists.** The meeting will be held in the College of Technology, Northampton.

The London Section, Food Group, and Agriculture Group of the **Society of Chemical Industry** hold a joint meeting on **April 3,** at 2.45 p.m., in the London School of Hygiene, Keppel Street, W.C.1. Papers will be read by Mr. W. E. Rhodes, Mr. A. F. Davies, Mr. F. Hirst and Mr. W. B. Adam on the processing of canned potatoes.

Mr. F. Walls and Dr. J. E. Sisson are to read a paper entitled "Plastics for Road Vehicles," at a general meeting of the **Institution of Automobile Engineers** at the Royal Society of Arts, Adelphi, W.C.2, on **April 4,** at 6.30 p.m.

The annual meeting of the Huddersfield Section of the **Royal Institute of Chemistry** takes place on **April 4,** at 6.30 p.m., in Field's Café, Huddersfield, to be followed by a paper on "Boiler Feed Water Treatment" by Mr. D. Dunn.

The next meeting of the Midlands Centre of the **Electrodepositors' Technical Society** takes place at the James Watt Memorial Institute on **April 4,** at 5.30 p.m., when Mr. H. Silman, B.Sc., A.I.C., A.M.I.Chem.E., presents a paper on "Wetting Agents—Their Use in Electroplating and Allied Processes."

A meeting of the **Society of Public Analysts** will be held at 5 p.m., on **April 5,** in the Chemical Society's rooms, Burlington House, Piccadilly, London. The following papers will be presented: "The Determination of Residual Carbon Dioxide in Aerating Powder," by C. K. Boundy, A.I.C., and R. W. Morris, B.Sc., F.I.C.; "The Volumetric Determination of Tin in Brasses and Bronzes;" by F. H. Edwards, B.Sc., and J. W. Gailer, B.Sc.; "The Determination of Lead as Molybdate," by H. Holness, M.Sc., A.I.C.

The 22nd annual meeting of the **Institution of Chemical Engineers** will be held on **April 14** at the Connaught Rooms, Great Queen Street, W.C.2. The business meeting starts at 11 a.m., to be followed by the address of the president, Mr. F. A. Greene, on the subject of "Our Title: A Reminder." The luncheon is arranged for 1 p.m., and at 3 p.m., Mr. J. G. Bennett, director of the B.C.U.R.A., will deliver the first Reavell lecture on "Coal and the Chemical Industry."

Company News

A. Boake, Roberts and Co., Ltd., are paying an interim dividend of 1½ per cent. (same).

Milton Antiseptic, Ltd., report a profit, for the year ended September 30, of £30,893 (£59,095), and are paying an ordinary dividend of 12½ per cent. (same).

Blythe Colour Works, Ltd., announce a net profit for 1943 of £25,761 (£33,506), and an ordinary dividend of 5 per cent. (same).

British Xylonite, Ltd., have recorded a net profit for 1943 of £37,230 (£28,296). The ordinary dividend is again 10 per cent.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

PROMEDICO PRODUTS, LTD., London, N., chemical manufacturers. (M., 1/4/44.) March 13, assignation, securing to Clydesdale Bank, Ltd., all moneys due or to become due to the Bank; charged on contract moneys. *Nil. March 30, 1942.

Company Winding-up Voluntarily

THAMES CHEMICALS, LTD. (C.W.U.V., 1/4/44.) March 9 (members). S. Docwra 9 Arundel Street, Strand, W.C.2, liquidator.

Chemical and Allied Stocks and Shares

BUSINESS in Stock Exchange markets has again been on a limited scale, as main attention has attached to the savings drive. Nevertheless, British Funds maintained a firm undertone, and in most other sections of markets sentiment was assisted by the small amount of selling in evidence. Imperial Chemical at 38s. 6d. were again little changed in price, awaiting the impending dividend announcements. Turner & Newall remained in favour and strengthened further from 80s. 9d. to 81s. 1½d. On the other hand, Lever & Unilever eased from 36s. to 35s. 6d.

Among shares of companies connected with plastics, De La Rue were higher at 166s. 3d., while Erinoid 5s. ordinary were 11s., and British Industrial Plastics 2s. ordinary 6s. 7½d. Lewis Berger moved higher to 102s. in response to market talk of the possibility of an increase in the forthcoming interim dividend. Elsewhere, General Refractories moved back to 15s. 3d., pending publication of the results. Pinchin Johnson at 35s. were better on balance, as were British Aluminium at 47s. 3d. Firmness at 80s. 3d. was shown in British

Oxygen, in front of the dividend announcement, while in other directions, Wall Paper Manufacturers deferred were better at 38s. 6d. An improvement to 76s. 3d. "middle" was made in B. Laporte which, however, showed dealings up to 78s. 9d. W. J. Bush were 60s., and Cellon 5s. ordinary 23s.

A better tendency developed in iron, steel, and allied shares, sentiment in regard to which was assisted by the reference in the Prime Minister's speech to the steel that will be required after the war for prefabricated houses. Stewarts & Lloyds moved up from 54s. 3d. to 54s. 9d. (the results are due in this case), while Dorman Long were 26s. 6d. compared with 26s. a week ago. United Steel were better at 24s. 1½d., while Staveley were 49s., Tube Investments 96s. 3d., and Babcock & Wilcox 49s. 10½d. Among textiles, Bradford Dyers eased from 21s. 6d. to 21s. 3d., while British Celanese were 27s., compared with 28s. a week ago. Courtaulds became firmer at 52s. 4½d.

Monsanto Chemicals 5½ per cent. preference were 23s., while Greeff-Chemicals 5s. ordinary were again 7s. 3d., and British Drug Houses 22s. 6d. Burt Boulton, whose interim dividend is due shortly, were also 22s. 6d. Lawes Chemical were 13s. and Fisons 49s. Elsewhere, William Blythe 3s. ordinary kept around 9s. Dunlop Rubber have been steady around 41s., awaiting the financial results. In other directions there was a reaction to 36s. 4½d. in Triplex Glass. A rise from 72s. 6d. to 73s. 9d. was shown in Nairn & Greenwich, and Barry & Staines were 44s. 7½d. At 63s. Associated Cement have been unchanged as compared with a week ago, while British Plaster Board eased to 29s. 9d. Gas Light & Coke ordinary at 19s. 7½d. were quite well maintained on balance. The units of the Distillers Co. at 88s. have also been well maintained, and United Molasses were firmer at 32s. 7½d. Murex remained at 102s. 6d., but Amalgamated Metal eased to 17s. 3d. Allied Ironfounders moved higher to 50s. At 13s. Imperial Smelting were the same as a week ago, as were Borax Consolidated at 36s. 4½d.

Boots Drug remained at 42s. 9d., Sangers were 24s. 4½d., and Timothy Whites 44s. 3d. British Match at 41s. were within 3d. of the level current a week ago. Beechams deferred have been inclined to improve, pending the dividend announcement, and were 17s. 3d. Among oil shares, Anglo-Iranian were well maintained at 115s. Burmah Oil were 77s. 6d. and "Shell" 73s. 9d.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.

British Chemical Prices

Market Reports

THE London market for general chemicals presents a steady appearance and most sections report a sustained demand. Prices generally remain firm and no changes fall to be reported this week. The delivery of supplies against contract commitments is well up to schedule and a fair amount of fresh business has been in evidence. In the soda products market bicarbonate of soda is being taken up in good quantities and quotations are well held, while a steady inquiry is reported for nitrate of soda, Glauber salt, salt cake, and soda ash. Acetate of soda is meeting with a quietly steady demand and both the commercial and photographic grades of hyposulphite of soda are being taken up in fair quantities. In phosphate of soda a steady trade is being done at firm prices. In the potash section offers of bichromate of potash are being distributed to priority users at the schedule rates. Permanganate of potash is well maintained and home producers indicate a steady call for supplies. Offers of solid caustic potash are being steadily absorbed, with values maintained at the official levels, while there is still a pronounced scarcity of liquid caustic potash, quotations for which are more or less nominal. Among the miscellaneous chemicals, calcium carbide, sulphur, and white powdered arsenic are all strong sections, with sales on steady lines, while formaldehyde is in good demand, with values firm. There is nothing fresh to report from the coal-tar products market. The light distillates continue in steady demand and the benzols, xylols, and toluols are active. Offers of creosote oil and carbolic acid are quickly absorbed.

MANCHESTER.—Chemical prices on the Manchester market during the past week have been on a generally stable basis, and while there has been little in the way of actual movement, the undertone is strong. Contract commitments in the alkalis and other leading heavy materials are substantial in the aggregate, and sellers report that these are being drawn against steadily by industrial consumers in Lancashire and the north-west generally. Additional bookings during the past week have been on a moderate scale. With regard to the by-products, pretty well all descriptions in both the light and heavy sections are now on a controlled price basis, and the movement into consumption, with an odd exception, is active.

GLASGOW.—In the Scottish heavy chemical trade there has been an improvement during the past week for home business. Export trade remains rather limited. Prices keep very firm, with no actual changes to report.

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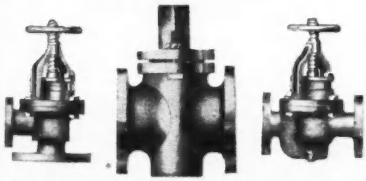

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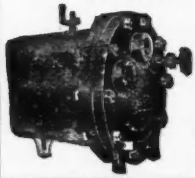

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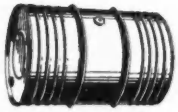

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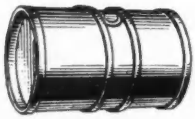

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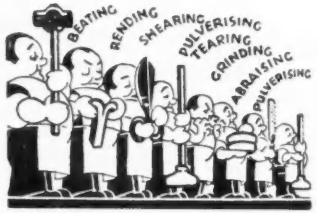

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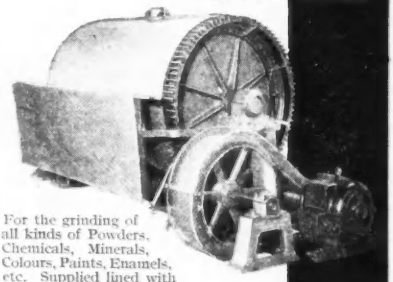

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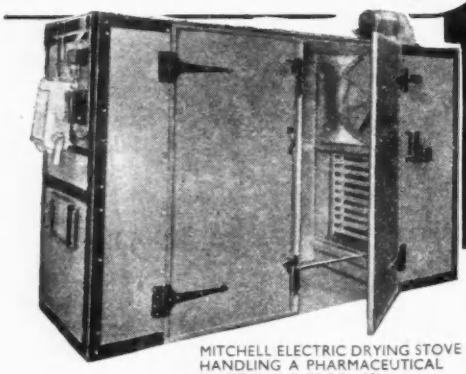

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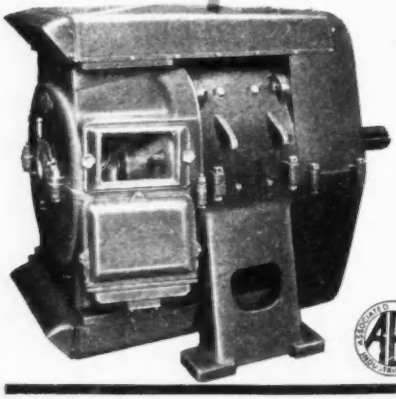
M.D. 8

FOR CORROSIVE AND DUSTY Atmospheres



The " Metrovick " totally-enclosed motor with integral fan operated air cooling circuits is designed for use in the corrosive and dusty atmospheres of Chemical and Gas Works

METROPOLITAN Vickers ELECTRICAL CO. LTD.
TRAFFORD PARK MANCHESTER 17.

J/C201

Printed in Great Britain by THE PRESS AT COOMBELANDS, London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4, April 1st, 1944. Entered as Second Class Matter at the New York, U.S.A., Post Office.